Smoking Habits in a Hospitalized Population: 1970–1980

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Abstract: The smoking habits of 23,953 hospitalized men and women aged 20 to 80, interviewed in nine United States cities between 1970 and 1980, were examined. Comparisons were made of age-adjusted smoking rates in 1970–1975 vs 1976–1980, stratified by sex, race, and educational level. An overall decrease in smoking exposure between the time periods studied was observed: a decline in rates of current cigarette smokers and an increase in use of cigarettes containing ≤12 mg tar. Nevertheless, among current smokers, there was no reduction in the proportions of those who smoke 31+ cigarettes daily. An enhancing effect of higher education on rates of smoking cessation and use of cigarettes containing ≤12 mg tar was observed. In both time periods, proportionately more Black than White men were smokers, although the difference was smaller in college educated groups. These findings point up the limited effectiveness of public health education about smoking in lower socioeconomic groups, and suggest that in the future, lung cancer and other diseases for which smoking is a major factor will be increasingly social class related diseases. (*Am J Public Health* 1983; 73:1293–1297.)

Introduction

Various reports in the literature have indicated changes in the smoking habits of the American population in the past decade.[1] Such changes provide indicators of the effects of public health education, and provide a basis for making predictions regarding the future rates of tobacco-related diseases. The specificity of this information for public health application is enhanced when the data are disaggregated by subgroup characteristics previously seen to affect smoking behavior. Previous studies have shown differences in susceptibility to public health recommendations on smoking by socioeconomic status and race.[2]

This report will examine and compare rates of various smoking habits as seen in a sample of adult hospital patients interviewed between 1970 and 1980.

Materials and Methods

Subjects

The data for this investigation consist of demographic and tobacco use information obtained from 23,953 men and women in the "control" file of an ongoing retrospective study of the relationship between tobacco use and disease.[3] While the acceptable ages for the study are 20 to 80, 76 per cent of these men and 70 per cent of these women who were age matched to adult cancer cases are older than 45 years, with mean ages of 55.0 and 53.5 for men and women, respectively. Subjects were interviewed between 1970 and 1980 while they were patients in selected hospitals in nine cities across the US. The geographic distribution of the sample is: New York 31 per cent, Los Angeles 24 per cent, Houston 11 per cent, Birmingham 8 per cent, Philadelphia 7 per cent, Miami 6 per cent, San Francisco 5 per cent, Chicago 4 per cent, New Orleans 4 per cent. Following the protocol of the parent study, details of which have been described previously,[4] "controls" were patients who had been diagnosed with non-tobacco-related conditions. The diagnoses of the controls seen in this study are: cancers 40 per cent (stomach, colon, prostate, breast, cervix, skin, leukemia, lymphoma, sarcomas, myelomas, bile ducts, gall bladder, ovaries, endometrium, thyroid, nervous system, pancreas-islet cell); benign neoplastic disease 11 per cent; and non-neoplastic conditions 49 per cent (burns, gall bladder disease, infectious disease, pneumonia, urinary tract infections, fractures, disc problems, traumatic injuries, hernia, arthritis, BPH, cataract, diabetes, Parkinsons, pancreatitis, no evidence of disease).

Smoking Variables

Subjects were classed according to their smoking history as never smokers, cigar and/or pipe smokers exclusively, ex-cigarette smokers (smoked cigarettes regularly in the past but not within the year prior to the time of interview), and current cigarette smokers (smoked cigarettes regularly at the time of interview for at least one year). Current cigarette smokers were further subdivided according to the tar content of the last brand smoked and the average numbers smoked daily. Tar levels were determined by using the December 1981 listing published by the Federal Trade Commission[5] for the period 1976–80, and the April 1976 listing[6] for the period 1970–75.

Analysis of Data

Distributions of the smoking variables of interest were done separately by sex, educational level, and race. To account for differences in smoking patterns by age, the data were age-standardized (≤45, 46–55, 56–65, 66+) using the direct method.[7] Previous analyses of the data had shown no significant differences in smoking rates by geographic area; therefore, no adjustment for the effects of this variable was done. The statistical significance of differences observed between time periods, adjusted for the interactions between smoking and age, and time period and age were determined by loglinear analysis,[8] and set at the .05 level.

Results

Changes in Smoking Rates

With the exception of data on college educated Black females whose numbers in this study were relatively small, the percentage of smokers among the subgroups differed significantly ($p < .05$) between the time periods studied (Table 1). The decline in current smokers was about 10 per cent in White men and 5 per cent in White women, figures

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TABLE 1—Percentage Distribution of Age-Adjusted Smoking Categories in Two Time Periods, Hospital-Based Controls Interviewed in 1970–1980

	High School or Less			College or More		
	1970–75	1976–80	% Change	1970–75	1976–80	% Change
White Males	(N:3864)	(N:2459)		(N:3150)	(N:2034)	
Current cigarette	47.5	37.8	−9.7	35.5	25.3	−10.2
Ex-cigarette	25.4	32.3	6.9	25.9	33.4	7.5
Cigar/Pipe	8.0	7.5	0.5	10.2	12.2	2.0
Never smokers	19.1	22.4	3.3	28.4	29.1	0.7
	$p < .001$			$p < .001$		
White Females	(N:3936)	(N:1570)		(N:2389)	(N:923)	
Current cigarette	33.1	28.0	−5.1	34.1	28.9	−5.2
Ex-cigarette	10.5	15.4	4.9	14.9	21.9	7.0
Never smokers	56.5	56.6	0.1	51.1	49.2	−1.9
	$p < .001$			$p < .001$		
Black Males	(N:1383)	(N:208)		(N:208)	(N:86)	
Current cigarette	59.4	55.1	−4.3	54.2	36.5	−15.7
Ex-cigarette	16.2	19.8	3.0	11.6	26.0	14.4
Cigar/Pipe	7.6	5.8	−1.8	8.1	9.9	0.8
Never smokers	16.8	19.3	2.5	26.1	27.6	1.5
	$p < .001$			$p < .05$		
Black Females	(N:1380)	(N:145)		(N:174)	(N:44)	
Current cigarette	39.3	25.0	−14.3	42.3	26.5	−15.8
Ex-cigarette	9.3	10.2	0.9	6.8	12.9	6.1
Never smokers	51.3	64.7	13.4	50.8	60.7	9.9
	$p < .05$			N.S.		

that are strikingly similar to those observed by the Gallup Poll between 1972 and 1981.[9] Rates of decrease were similar by educational level among White men and women, as well as in Black women. Among Black men, an important effect of educational level was apparent in that a greater decrease in current smoking was seen among the college (15.7 per cent) than high school (4.7 per cent) educated. In the latter time period the percentage of current cigarette smokers among the higher educated White males was lower than those observed in women of all race and educational categories.

An enhancing effect of higher educational level on smoking cessation was evident in all sex/racial groups, but was particularly so among Black men in whom the decline in ex-smoking rates between time periods was 14.4 per cent in the college educated and only 3.0 per cent in the high school educated groups.

Smokers of Cigarettes <12 mg Tar Level

Comparisons using this variable as well as consumption of 31+ cigarettes per day were limited to current cigarette smokers. Because of the small numbers that resulted from this restriction, the data shown were analyzed by sex and educational level, but not by race.

Dramatic and highly significant increases in the rate of use of cigarettes with ≤12 mg tar occurred over the time periods studied in both men and women (Figure 1). The magnitude of these increases was greater in women than men and in college than high school educated groups, although the difference by education was less pronounced in women than in men. If the rate of increase (2- to 3-fold) as observed in these data continues, more than half of all female smokers and male college educated smokers but only 39 per cent of high school educated males would be smoking cigarettes delivering <12 mg of tar by the mid-1980s.

Smokers of 31+ Cigarettes Daily

Earlier studies have shown that among current cigarette smokers, about half smoke a pack or more a day, regardless of socioeconomic status.[10–13] To improve our ability to detect an effect of educational status on rate of heavy smoking, we narrowed our definition of heavy smoking to daily smoking of 31+ cigarettes.

No reduction in smoking exposure in terms of the proportions of those who smoke 31+ cigarettes daily among current cigarette smokers was observed (Table 2), a trend also seen in studies by the National Center for Health Statistics (NCHS).[14] Instead, what occurred among current smokers was some increase of heavy smokers in all but the high school educated males, although only the change among high school women was significant at the .05 level. In light of

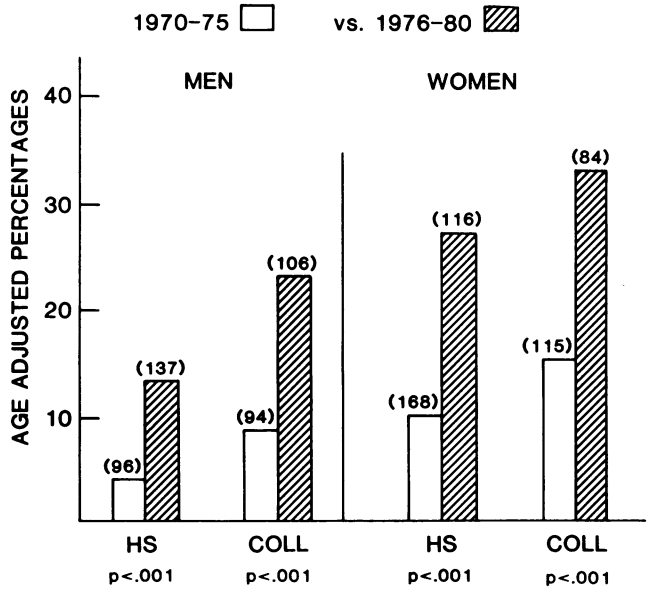

FIGURE 1—Smokers of Cigarettes with ≤12 mg Tar among Current Smokers.

TABLE 2—Age-Adjusted Percentages of Smokers of 31+ Cigarettes per Day in Two Time Periods by Education and Sex

Education	Males			Females		
	1970–75	1976–80	% Change	1970–75	1976–80	% Change
High School	(N:574)	(N:252)		(N:244)	(N:67)	
% of all current smokers	20.3	18.9	−1.4	12.0	17.5	5.5
% of persons interviewed*	9.2	11.2	2.0	9.2	9.5	0.3
College	(N:297)	(N:145)		(N:130)	(N:49)	
% of all current smokers	23.2	26.2	3.0	14.2	15.6	1.4
% of persons interviewed*	12.2	10.5	−1.7	10.1	10.6	0.5

*Raw totals include non-smokers, ex-smokers, cigar and pipe smokers, current smokers of 1–31+ cigarettes daily, and cigarette smokers of unknown quantities.

TABLE 3—Percentage Distribution of Tar Levels According to Number of Cigarettes Smoked, Current Cigarette Smokers, 1977–1980

Tar Level	Number of Cigarettes Smoked				
	1–10	11–20	21–30	31+	Total
			Males		
Filtered Cigarettes	(N:224)	(N:553)	(N:206)	(N:327)	(N:1310)
≤5 mg	4	5	4	7	5
6–12 mg	11	11	14	13	12
13–20 mg	59	59	53	54	57
Nonfiltered >20 mg	26	25	29	25	26
			Females		
Filtered Cigarettes	(N:115)	(N:232)	(N:65)	(N:74)	(N:486)
≤5 mg	15	10	15	11	12
6–12 mg	26	23	22	23	23
13+ mg	56	55	54	61	56
Nonfiltered >20 mg	3	12	9	5	8

the previous finding that the proportion of ex-smokers in the present sample has also increased over time, this latter finding suggests that among those continuing to smoke in this study, greater proportions than those in the ex-smoking ranks were heavy smokers. These are the habituated smokers, either unwilling or unable to stop in spite of widespread pressures to do so. It is of interest that, consistently over time, these heavy smokers were more frequently found among men of higher rather than lower educational status, whereas among women this trend was no longer apparent in the 1976–80 time period.

When the estimates of current heavy smokers were based on the total number of persons interviewed within each sex/educational subgroup, an examination of the results shows virtually no differences over time among the women and only small differences among the men (Table 2). The direction of change among the men is opposite that observed when rates were based on current cigarette smokers only. Among the college level males, this reflects the effect of increased smoking cessation over time, whereas among high school level males, the increase in heavy smokers reinforces earlier indications that antismoking efforts have been less successful among those in lower socioeconomic levels.

Tar Level and Quantity Smoked

The findings that proportions of cigarette smokers who smoke 31+ daily have increased over time, and that more smokers are smoking the low-tar cigarette raises the question of whether or not shifting to a lower yield cigarette results in increased cigarette consumption. We tested this question using data collected from current cigarette smokers between 1977 and 1980.*

As seen in Table 3, we found no overall association between tar level and the number of cigarettes smoked ($p = 0.37$ in men and $p = 0.36$ in women). This suggests that, on a general level, compensation in the form of increased numbers smoked does not occur. We recognize, however, that this finding does not disprove that some smokers who shift to cigarette brands with lower tar and nicotine increase the number of cigarettes they smoke. In fact such a possibility receives some support from trends shown in Table 4, a comparison of cigarette consumption levels of brand changers categorized either as changers to a brand of lower tar yield (6+ mg) or changers to a brand of similar tar yield (±5 mg). As shown, those who increased their rate of cigarette consumption were proportionately higher, though slightly, in both sexes among switchers to a lower tar cigarette than among switchers to a brand of similar tar yield. The data in Table 4 also showed that regardless of change by tar level,

*A new questionnaire form was instituted in 1977. Since this question did not involve a time-trend comparison, data obtained with earlier versions were excluded in this analysis.

TABLE 4—Percentage Distribution of Change in Reported Number of Cigarettes Smoked Daily by Type of Brand Change among Current Cigarette Smokers, 1977–1980

	Switched to Lower Tar	Switched to Similar Tar
Males	(N:671)	(N:365)
No Change	65	63
Decreased	12	16
Increased	24	21
Females	(N:276)	(N:126)
No Change	73	75
Decreased	5	7
Increased	21	18

the majority (63–65 per cent in men, 73–75 per cent in women) smoked the same amount (±5 cigarettes), an observation that explains in part the previous finding (Table 3) of no association between tar level and number of cigarettes smoked.

Discussion

Because of the selective nature of our sample, the possibility that smoking rates observed among them may differ from those existing in the larger population was a major concern. Accordingly, we compared smoking patterns observed in our study with those reported nationally and found the data to agree. For data collected in 1970 to 1974, this congruence was reported in an earlier paper,[10] and may be seen in Table 5 for data collected in 1976 to 1980. Nevertheless, the mechanisms which drew our subjects to the hospitals participating in our study, e.g., type and severity of illness, residence, socioeconomic status, may have distorted the observed rates of smoking exposures after disaggregation by education and race; Berkson's bias[15] is a further possibility that remains. It is hoped that future observations of other surveys will throw light on this question.

It has been shown that the majority of American people are informed about the potential health hazards of tobacco usage.[16] But, as the present study shows, not everyone can transform health knowledge into the appropriate health behavior. While overall exposure to cigarette smoke seems to have declined in both females and males, Blacks and Whites, and in less as well as more educated groups, the changes have occurred in different degrees.

These findings point up subpopulations of smokers for whom health educators and behavioral scientists may need to modify their approaches. The proportion of heavy smokers among those who still smoke was higher in the more educated than in the less educated males. This finding may be related to cost factors for the low income groups (17), or to differences in the way the cigarette is smoked (e.g., butt length smoked); it may also reflect a special habituation to cigarettes among the relatively small group of educated males who continue to smoke in spite of knowledge regarding the hazards of smoking and social pressures to stop. We also found smoking education to be less effective among groups in the lower socioeconomic levels (Blacks and those high school educated or less).

Data analysis to test the hypothesis that smokers who switch to lower tar yield cigarettes may compensate by increasing the number of cigarettes smoked indicated that, for the majority of smokers this response does not occur, but that there may be a limited group of smokers who do engage in this type of compensatory smoking behavior. We believe that this question should be addressed in biochemical and epidemiological studies specifically designed to test this hypothesis.

The observed variations in exposure to cigarettes among different subgroups in our sample are likely to be reflected in differing rates of tobacco-related diseases. We are witnessing an increase in the incidence of lung cancer among Black males, a higher prevalence in lower educated than higher educated groups, and a steady increase of lung cancer among women.[18] However, future rates of lung cancer in women may not reach the levels seen earlier in men because, compared to men, women tend to smoke fewer cigarettes and to smoke those containing lower tar. Along with observations of greater smoking exposure among workers in occupations of lower status,[11,12] the finding of greater smoking in lower educated groups in this study

TABLE 5—Percentage Distribution in Comparison of Smoking Rates in AHF[1] and HIS[2] Data

	Males		Females	
Age	AHF	HIS	AHF	HIS
25–44 Years	(N:491)	(N:27,667)*	(N:362)	(N:29,314)*
Never smoker	31	33	44	49
Exsmoker	23	24	16	15
Current smoker	46	43	40	36
45–64 Years	(N:2855)	(N:20,487)*	(N:1628)	(N:22,693)*
Never smoker	26	23	52	50
Exsmoker	35	37	18	16
Current smoker	39	40	30	34
65+ Years	(N:1149)	(N:9045)*	(N:733)	(N:13,475)*
Never smoker	30	30	69	73
Exsmoker	45	47	17	15
Current smoker	25	23	14	12

[1]Male and female hospital-based controls interviewed 1976–80.
[2]Health Interview Survey, 1978; (Bureau of the Census, Statistical Abstract of the US, 1980).
*In thousands

suggests that in the future, lung cancer, and possibly other diseases for which smoking is a major factor, will be increasingly social class-related diseases.

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